Cultivating Class Innovation Through Transdisciplinary Teamwork and Sustainable Design

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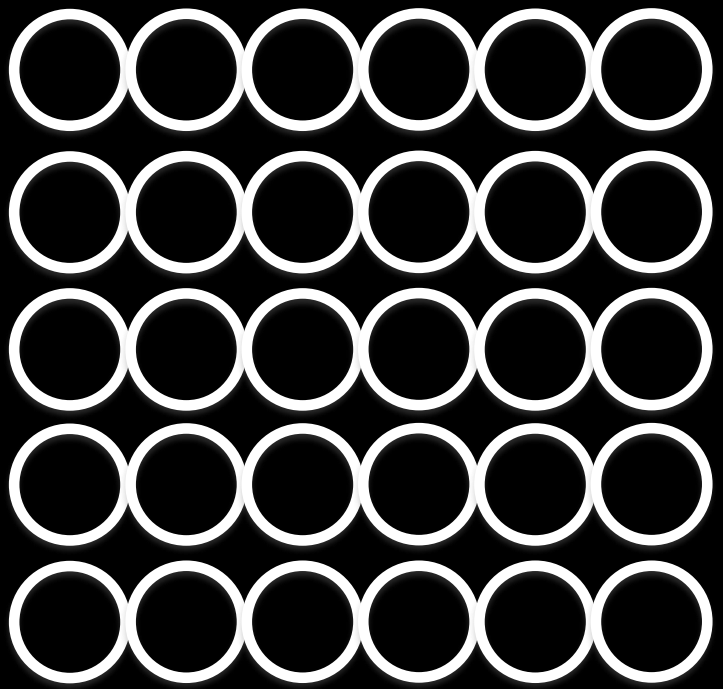
Objectives

- Gain tools and understanding towards setting up multi-disciplinary design teams for success

- Insight to sustainable design

30 Circles

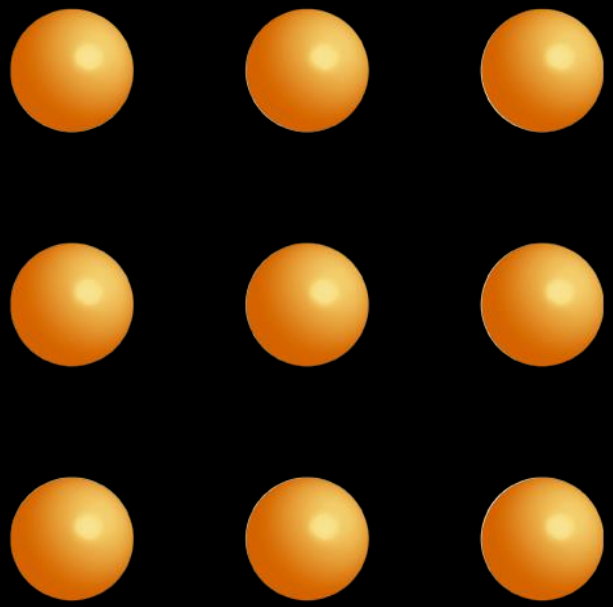
- Fill in as many circles to make recognizable objects
- 3 minutes!



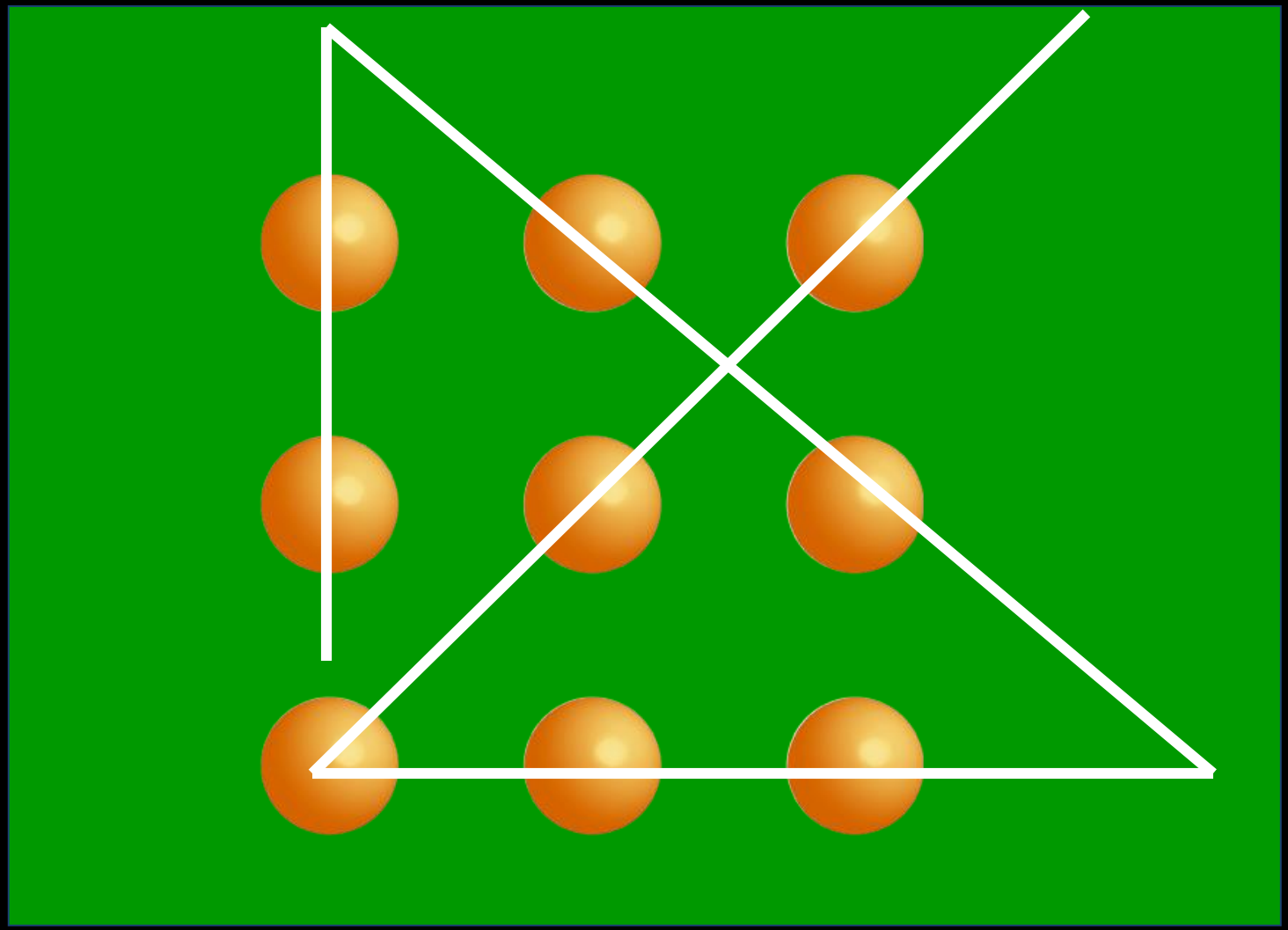
Robert McKim, Professor Emeritus of Stanford's Department of Mechanical Engineering

9 Dots

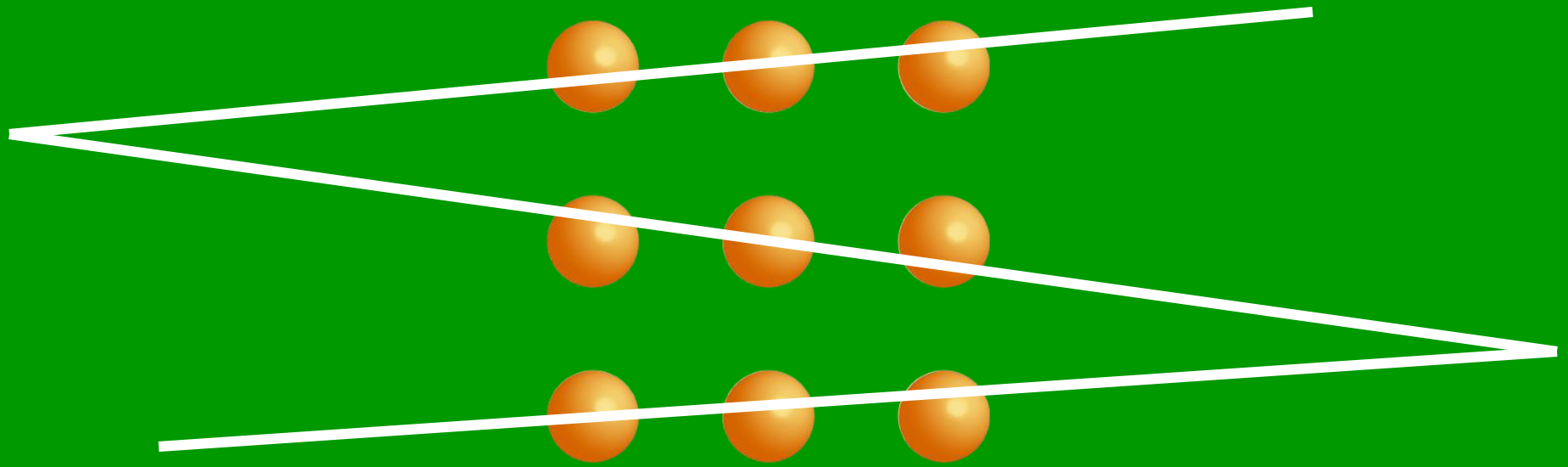
- Connect all 9 dots
- Lines can only be straight
  - No curved lines
- Do not pick up your pen



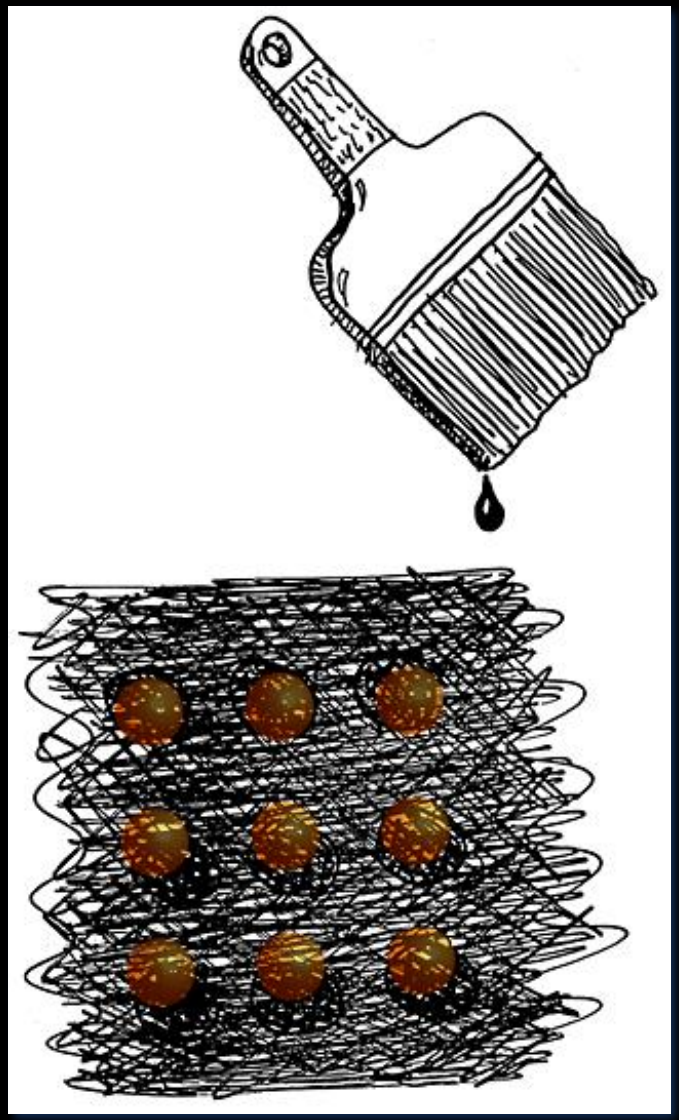
Origin unknown, but well used and liked!



Broadening your view…

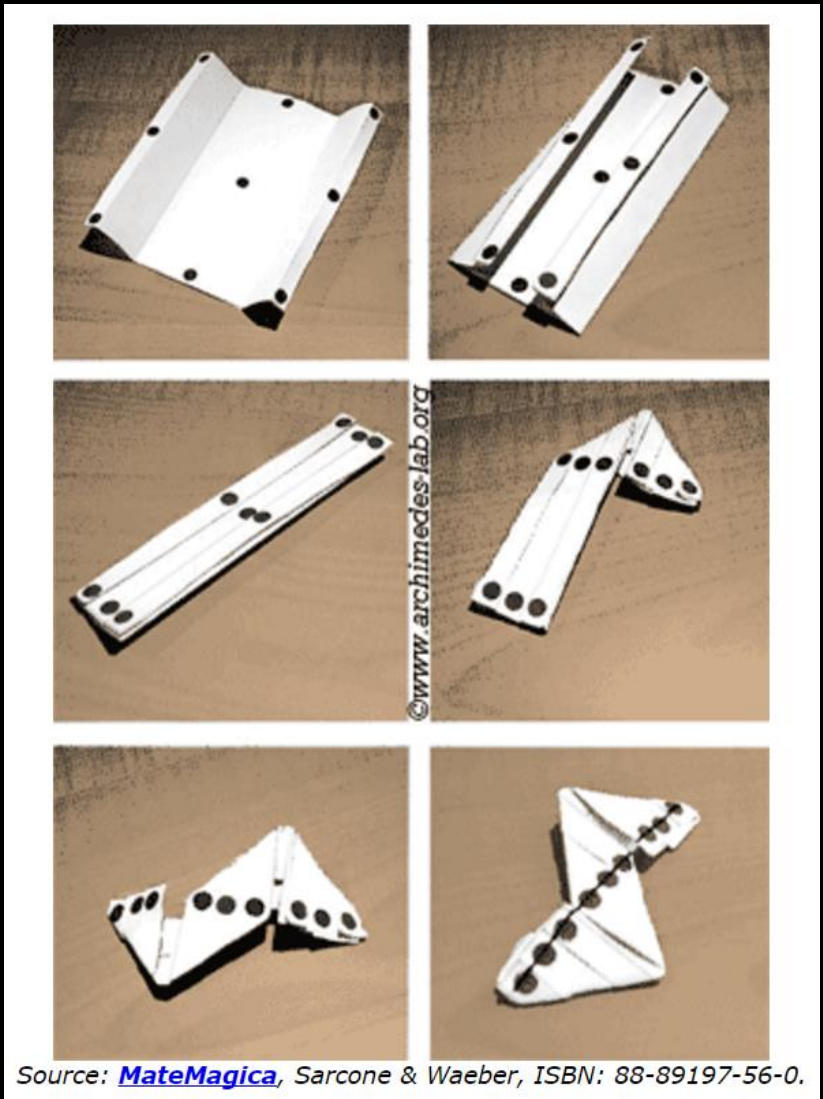


Management Solution

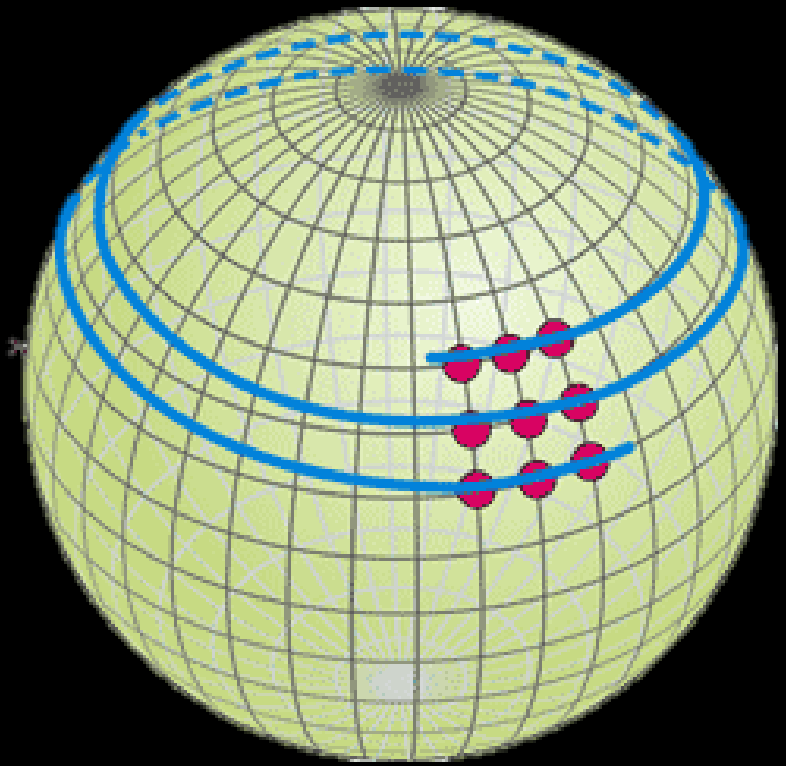


Wide Line solution

Origami Solution

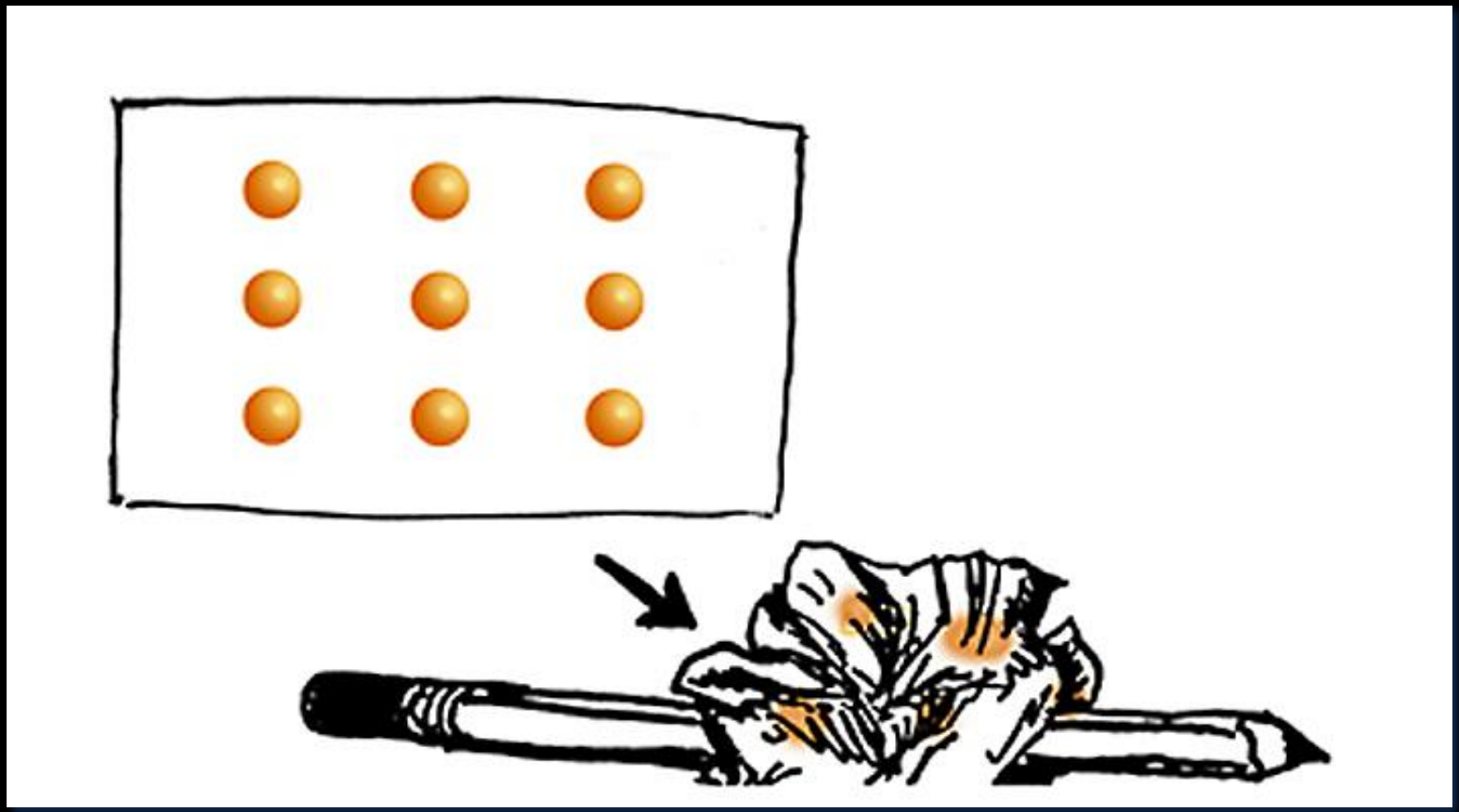


Geographer Solution

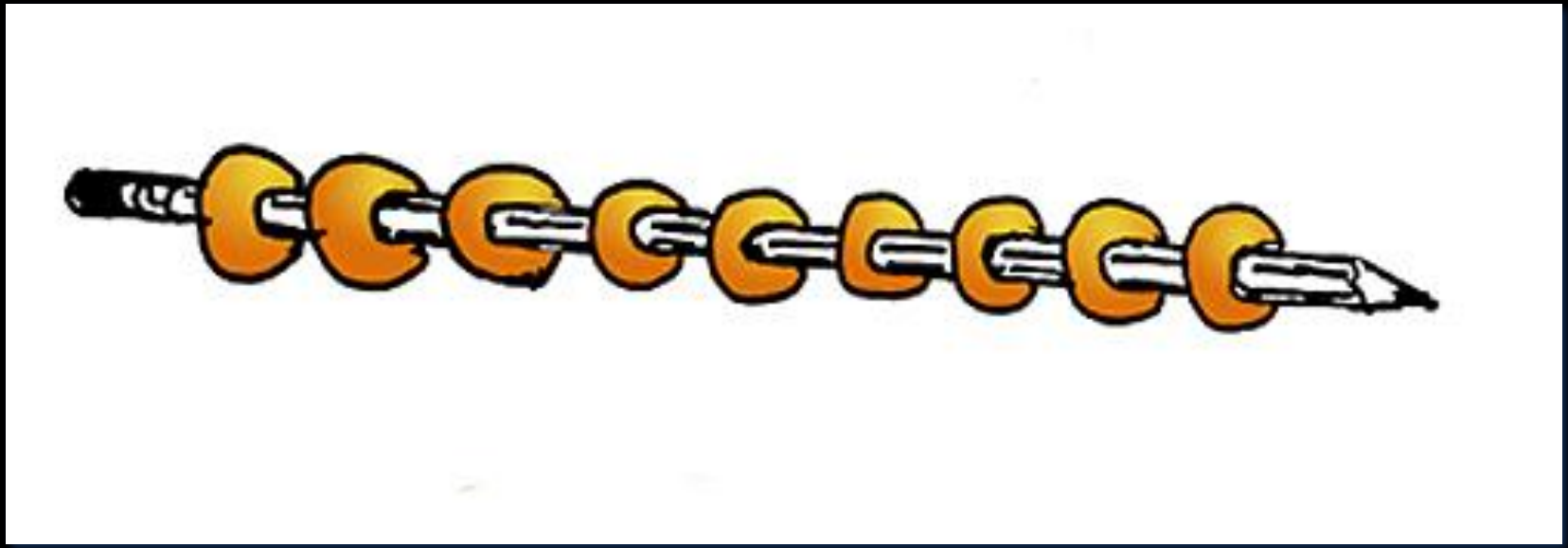


http://www.archimedes-lab.org/How_to_Solve/9_dots.html

Statistician Solution



Engineer Solution



Conceptual Blocks

- Constancy
  - Reusing solutions from similar problems
  - Instead: define & solve problems in multiple ways
- Commitment
  - Stereotype and simplistic assumptions
  - Instead: relax assumptions and note subtle differences and similarities

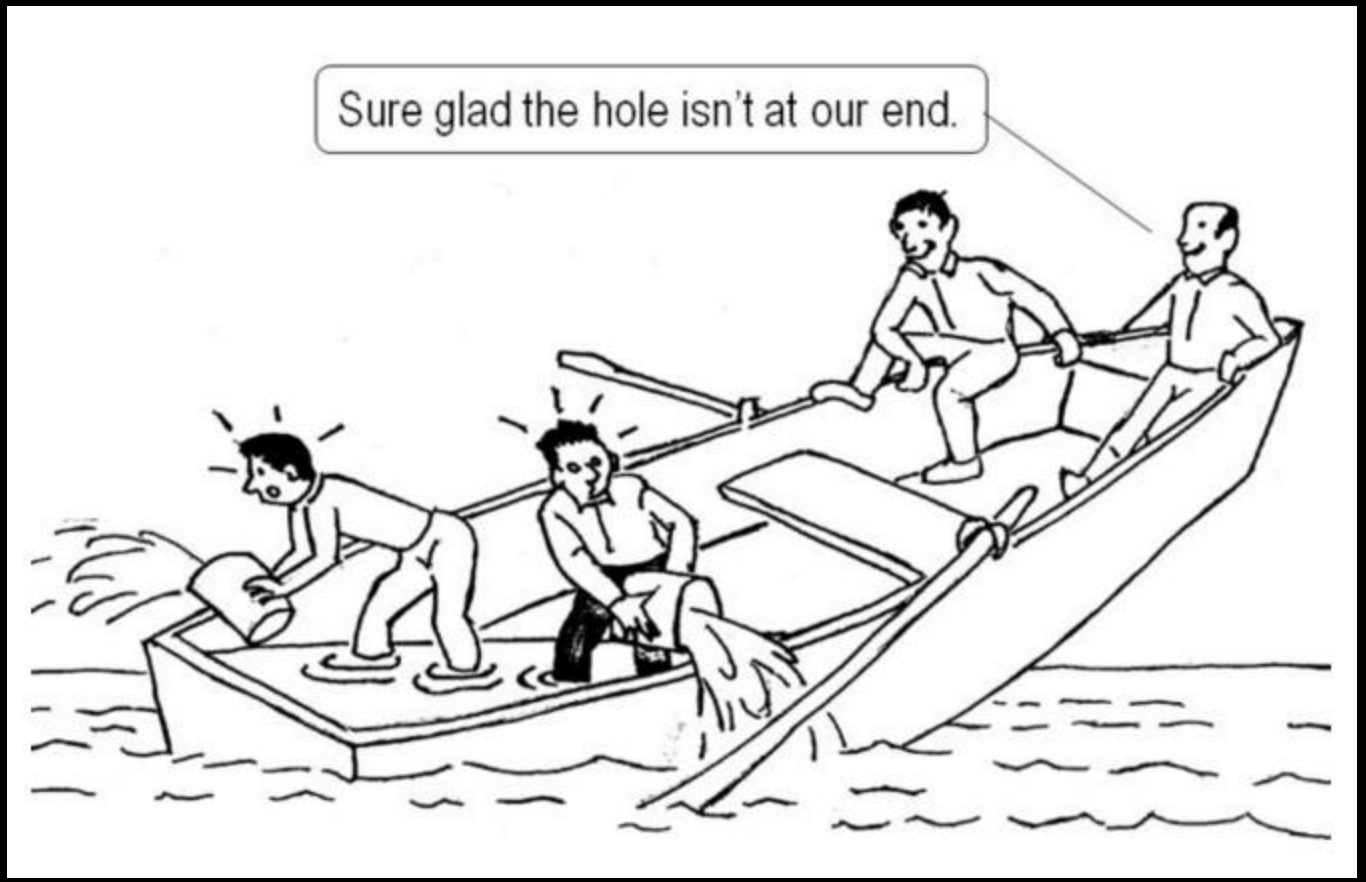
Whetten, D. A., & Cameron, K. M. (2002). Chapter 3: Solving Problems Analytically and Creatively. In D. A. Whetten and K. S. Cameron. Developing Management Skills. Fifth Edition. Upper Saddle River, NJ: Pearson Education, Inc., (Prentice-Hall), pgs. 155-178

Conceptual Blocks

- Complacency
  - Easily giving when no immediate solution
  - Instead: allow time to study problem and for creativity to incubate
- Compression
  - Limit information defining problem/solution
  - Assume some solutions are more appropriate
  - Instead: consider all relevant information; examine a variety of solutions

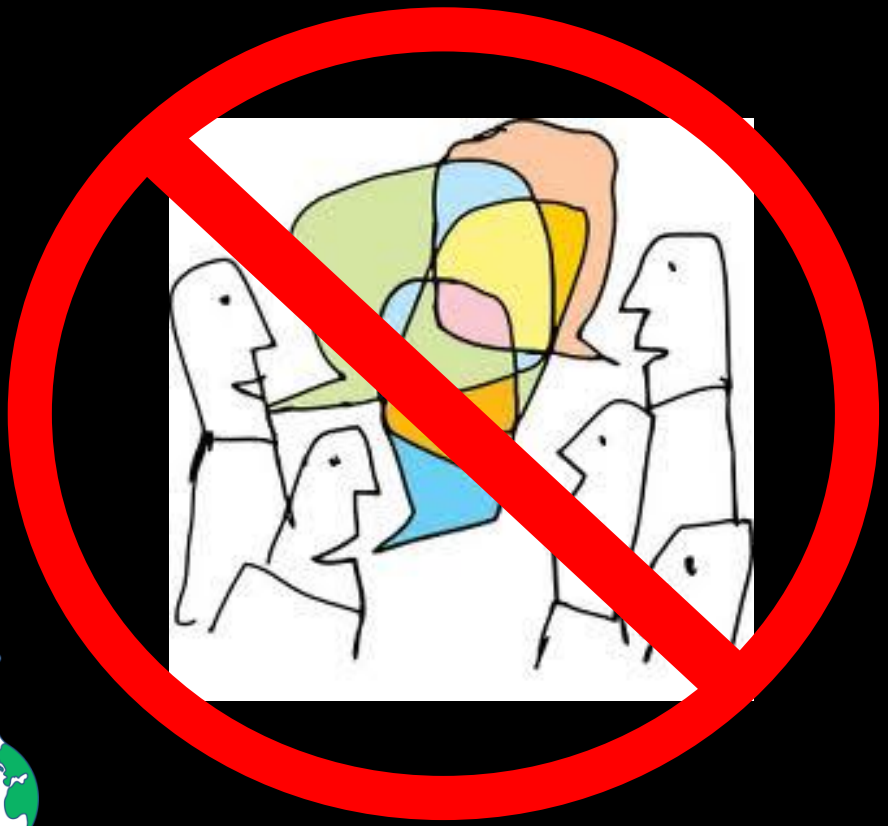
Whetten, D. A., & Cameron, K. M. (2002). Chapter 3: Solving Problems Analytically and Creatively. In D. A. Whetten and K. S. Cameron. Developing Management Skills. Fifth Edition. Upper Saddle River, NJ: Pearson Education, Inc., (Prentice-Hall), pgs. 155-178

Systems Thinking



Communication

- Critical to success
- Listening skills, speaking skills



Animality

- Read animal description
- Represent animal with a pipe cleaner
- Introduce animal to group *(w/pipe cleaner!)*
- Tell your group about animal
  - Forms, processes, ecosystems, ect.
  - Functional, neat, surprising facts and attributes
- Group “maps” key facts & functions

Biomimicry

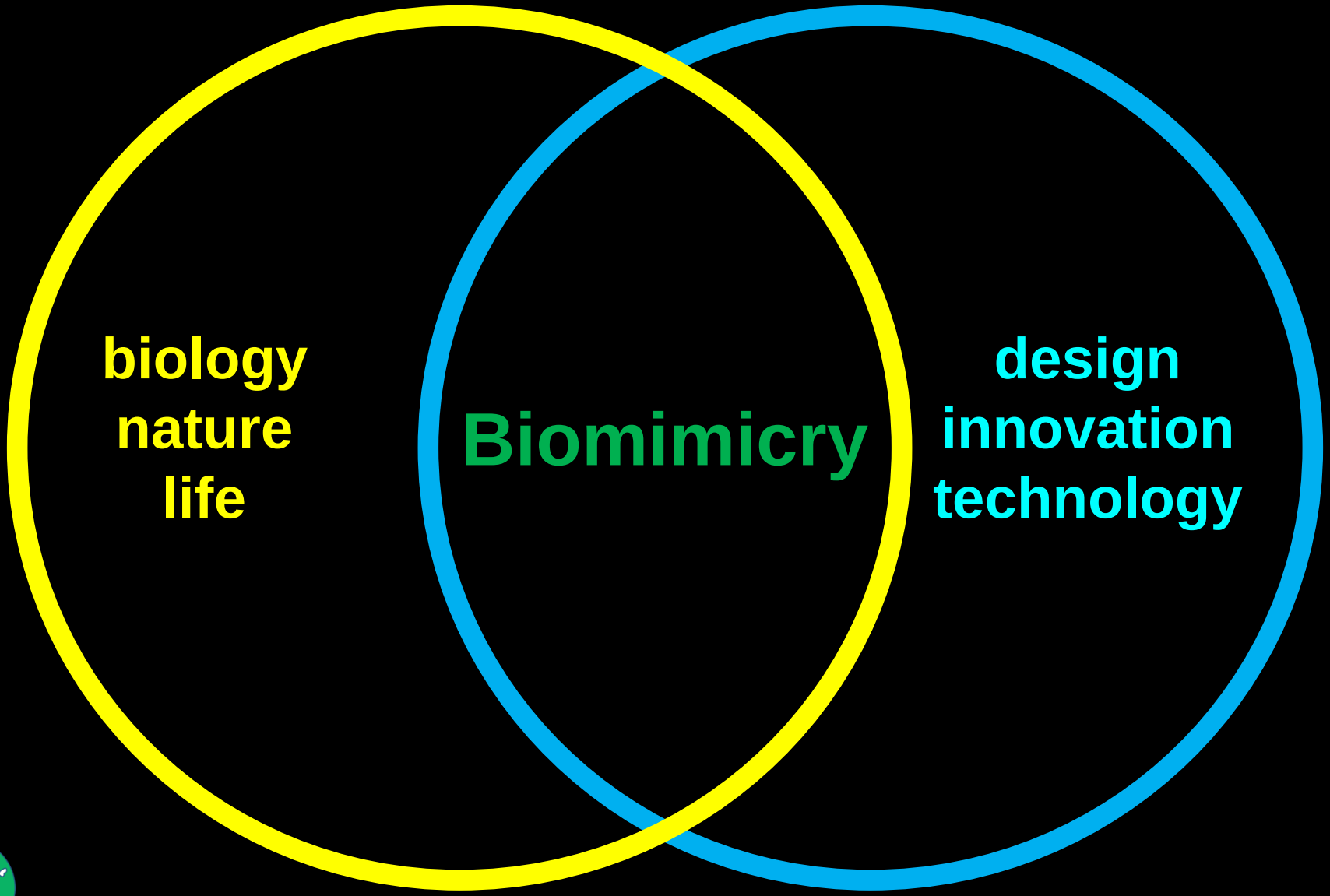
http://biomimicry.net/

Nature as a model, measure, and mentor

Biomimicry

- Not what we can extract from nature, but what we can ***learn*** from
- ***Conscious*** emulation of nature's "genius"

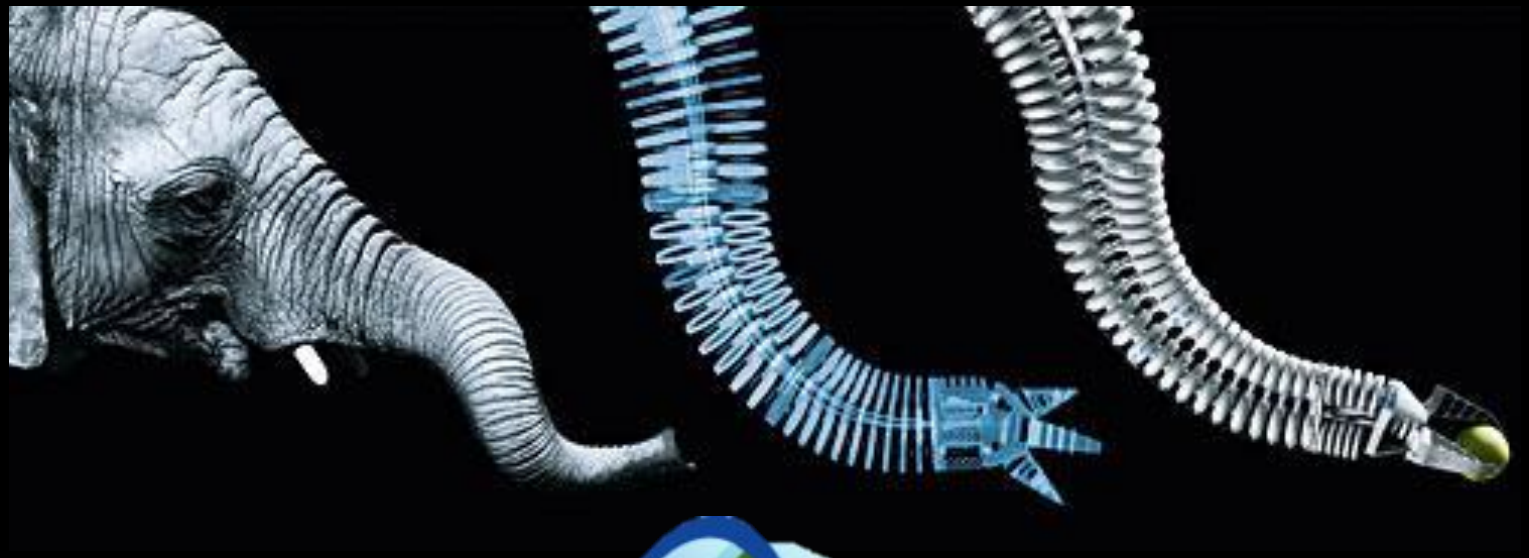
Intersection of Inspiration



Systems Challenges

- Ever-increasing stress on three key and interconnected resources
- Food, Energy, Water (FEW) Nexus
- FEW components
  - Natural
  - Social
  - Human-built

Setting and Plot



Yes, And

- From improvisational theater
  - Establish setting and plot
  - Accept the premise and add
  - Affirm what is being said and build upon it
  - Embrace ideas and concepts
- Start by saying “Yes, and…”

Imagine Solutions

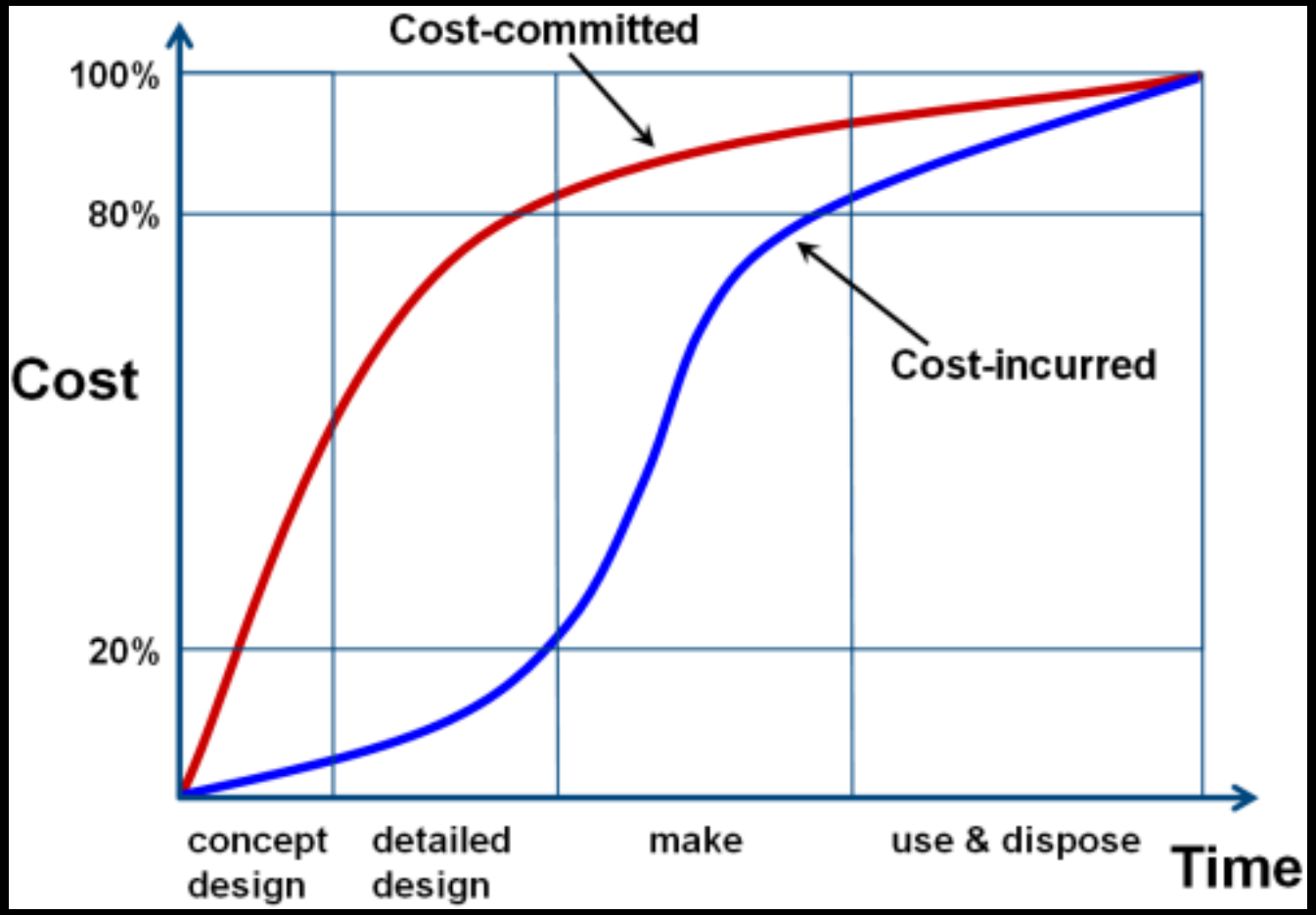
- Brainstorm and ideate
- Use “Yes, And…”
- Map ideas
- Generate multiple, possible solutions
- Agree on one product to “champion”
- Create an advertisement poster
  - Provide team name to get poster paper

A necessary caveat: How do we know our design is jumping in the right direction?

Some frogs are poisonous…..

Sustainability is a process of continuous improvement, we can't forget to check to make sure we're actually improving.

Design



Mihelcic, Zimmerman Environmental Engineering: Fundamentals, Sustainability, Design, John Wiley and Sons, 2009.

Objectives

- Gain tools and understanding towards setting up multi-disciplinary design teams for success
  - Activities to foster innovation, open other modes of thinking, and overcome conceptual roadblocks (*30 circles, 9 dots, ect.*)
  - Active listening and speaking (*Team presentations w/peer reviews, pipe cleaner, "Yes, And", ect*)
  - Safe environment for contributions
  - "Fast" design challenges: beginning to end satisfaction (compass to success for long design challenges)

Objectives

- Insight to sustainable design
  - Systems thinking; life cycle design
  - Biomimicry can catalyze innovation
  - Do the right things right
    - Not: the right things wrong

Multi-Disciplinary Innovation

Generating & considering *wild* ideas can seem like a waste of time, but it's often the route to an innovative solution

http://www.wright.edu/~scott.williams/LeaderLetter/cps.htm

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biomimicryworkshop.yale.edu

Reach Out